Just Google It!
Students constructing knowledge through internet travel

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Abstract:

As knowledge is the new economy, young people increasingly navigate information flows across multiple modalities to access, acquire, and construct knowledge. With the advent of Web 2.0 or the 'read/write web' (Achterman, 2006, p. 19), applications such as the Google suite and Wikipedia have become the standard service for information seekers and creators. Hailed as inherently participative, democratising and liberating, Web 2.0 enables travel along vast information scapes (Appadurai, 1996), and provides a platform for engagement and participation in national and international conversations.

This paper arises from an ARC Discovery grant. We analyse data from focus group discussions with students aged between 12 and 17 years from two regional and two urban independent secondary schools in Queensland. We examine what students have to say about their engagement with Wikipedia and Google in relation to completing school assignments. Specifically we focus on how students talk about collaborative knowledge sources, how they value knowledge from these sources, and how they perceive and mitigate the potential problems and risks of such knowledge.

We begin the paper by providing a description of conflicting viewpoints about the information potential and capabilities of Web 2.0 and the skills and knowledge that may be needed by young people traversing multiple information scapes. Our discussion highlights the ways that students encounter a variety of epistemic forms, and their attitudes to and engagement with the information sources they use.

We conclude by raising several pedagogical considerations, namely, (i) the significance for teachers and students to understand the different forms of information sources/tools that are increasingly available through web 2.0 platform, and the varying potential or value of these tools for information access and knowledge co-construction; (ii) the ways in which students traverse information scapes across both online and offline networks to access, acquire and share new knowledge; and (iii) the investments (personal, social, technological) required to access the vast knowledge networks available to students.

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INTRODUCTION

With the advent of Web 2.0 or the 'read/write web' (Achterman, 2006, p.19), Google has become the standard service for information seekers and creators. As Soules notes: 'Google is the current front-runner in all things "search engine", but it isn't just Google any more. It's Google Maps, Google Scholar, Google Book Search, and Google everything else' (2008, p.15). Both the Google applications and Wikipedia are part of the many services that are possible because of the Web 2.0 platform with its capacity for interactivity, 'user-generated content' and other capabilities (Appleyard, 2007). Hailed as inherently participative, democratising and liberating, Web 2.0 enables travel along vast information scapes (Appadurai, 1996), and provides a platform for engagement and participation in national and international conversations.

Our aim in this paper is to neither idealise nor denigrate the information scapes produced by Web 2.0 or the activities of youth engaged with global information flows. Rather, our objective is to examine what students say about a common schooling activity, the writing of assignments, particularly, as they traverse information scapes such as Google and Wikipedia as part of the knowledge seeking/construction process. We begin the paper by providing a description of conflicting viewpoints about the information potential and capabilities of Web 2.0. In the next section we consider the skills and knowledge that may be needed by young people traversing multiple information scapes. We then report on findings from our study as they highlight the ways that students encounter a variety of epistemic forms, and their attitudes to and engagement with the information sources they use. In the final part of this article, we discuss the implications of these findings, including the significance of young people's engagement with Wikipedia and Google applications for developing epistemic fluencies, the differences between popular perceptions of youth's understanding of new media environments and indications from the data, and pedagogical implications for teachers and policy-makers.

The Potentials and Risks of Web 2.0

Despite the buzz around Web 2.0, there are nevertheless conflicting viewpoints about this new platform and its liberating or devaluing potential. Prophets of Web 2.0 talk in straight libertarian terms of revolutionary possibilities: people's freedom to choose, speak out, and write back (Wales & Baraniuk, 2008). These prophets also talk about the 'wisdom' and 'power' of crowds (Sunstein, 2006). They claim that 'the expression of many opinions is a better way of attaining either the truth or the practical than the expression of just a few' (Surowiecki cited in Appleyard, 2007, p.12). For example, Sunstein (2006, p. 9) suggests that in terms of the 'aggregation of information, we are in the first stages of a revolution'. Open

source software, wikis and blogs are tools that can enable the aggregation of dispersed knowledge in many minds, 'allowing them to contribute to the activities and products' that concern everyone (Sunstein, 2006, p.148).

> … with the Internet, it is easy to obtain the views and even the collaboration of hundreds, thousands, and conceivably even millions of people … the Internet also offers exceedingly valuable exercises in information aggregation, as people learn a great deal from the dispersed bits of information that other people have (Sunstein, 2006, p.8).

The best way to find the answer to a 'disputed question of fact', according to Sunstein (2006, p.21) is to: '*Ask a large number of people and take the average answer*'. This claim about the validity and reliability of knowledge produced by groups is based on the Condorcet Jury Theorem:

> To see how the Jury Theorem works, suppose that people are answering the same question with two possible answers, one false and one true. Assume, two, that the probability that each voter will answer correctly exceeds 50 percent. The Jury Theorem says that the probability of a correct answer by a majority of the group increases toward 100 percent as the size of the group increases. The key point is that groups will do better than individuals, and big groups better than little ones, so long as two conditions are met: Majority rule is used, and each person is more likely than not to be correct (Sunstein, 2006, p.25).

On the other hand, critics of the new information scapes produced by Web 2.0 talk about the anti-enlightenment potential of the technology. Indeed, critics suggest that Web 2.0 destroys wisdom and culture by 'wishing away' hierarchies of knowledge and legitimising all voices (see Brabazon cited in Frean, 2008; Keen, 2007). Globally-connected information scapes are like a shopping mall broadcasting a 'cacophony of sounds' (Sunstein, 2006, p.18). Moreoever, Castells (2004, p.86) suggests that '[t]he spread of horizontal communication via the Internet accelerates the process of fragmentation and individualization of symbolic interaction.' These new patterns of social interaction challenge the very notion of a 'unifying culture' and lead to the need for the 'communicability of multiple codes' (Castells, 2004, p.86).

While Sunstein (2006) elaborates on the potentials of the internet in terms of aggregating information, he also warns of the risks: 'In terms of accuracy and quality, there is endless diversity − not merely clarity and sense and justified outrage, but also half-truths, falsehoods, confusions, self-promotion, and lies' (Sunstein, 2006, p.18). With respect to the Condorcet Jury Theory, Sunstein (2006, p.33) suggests that the 'judgement of a statistical group' can be wrong, and sometimes 'disastrously wrong'. This is likely to occur when (a) 'group members show a systematic bias', and (b) when the answers of individuals in a group 'are worse than random' (Sunstein, 2006, p.33).

Critics also suggest that the so-called freedom to choose from the vast array of information available on the internet negates the fact that many people do not have the resources to make informed choices (Appleyard, 2007, p.12). The 'digital divide' refers not only to access to technology and broadband facilities, but also access to the skills and knowledge needed to navigate the new information scapes (see Cranmer, 2006; Jenkins et al., 2006). As Ball

(2003) has argued, choice in the global knowledge economy is constructed within a set of neo-liberal market discourses. This conception of choice places responsibility firmly on the individual who must 'learn, on pain of permanent disadvantage, to conceive of himself or herself as the centre of activity, as the planning office with respect to his or her own biography, abilities, orientations, relationships and so on' (Beck cited in Ball, 2003, p.149). Those individuals with the economic, social and cultural resources to make informed choices are thus favourably positioned to construct advantaged life-biographies, orientations and relationships. By contrast, those individuals without such resources have limited choices and therefore limited life possibilities. Within market dominated neo-liberal discourses the gap between advantaged and disadvantaged 'individuals' increases. And the responsibility for economic, social and cultural disadvantage is placed firmly on the individual – the agent of choice. One way to assist young people in making informed choice is by instruction about online information environments.

Traversing Information Scapes

A number of educational researchers have suggested that young people need to be explicitly taught the skills of navigating and negotiating the new media/information scapes. For example, Jenkins et al., (2006, p.4) define transmedia navigation and negotiation as follows:

- **Transmedia Navigation** — the ability to follow the flow of stories and information across multiple modalities
- **Negotiation** — the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

We share Hakken's view that information cannot be separated from its social context and to do so, would result in 'separating what is known from the social conditions of its construction, reproduction, or sharing – dividing the knowledge from the networking' (Hakken, 2003, p. 161). At the same time, we differentiate between *information* as generated on Web 2.0 through blogs and other applications from *knowledge*. Information is defined as 'data that have been organized and communicated' (Porat cited in Castells, 2000, p.17). By contrast, we define knowledge as 'a set of organised statements of facts or ideas, presenting a reasoned judgement or an experimental result, which is transmitted to others through some communication medium in some systematic form' (Bell cited in Castells, 2000, p.17).

Hughes (2004) argues that the new social contexts of online information environments constitute new types of learners and new forms of learner-teacher, and learner-knowledge interrelationships. Specifically Hughes highlights the 'important influence of social interaction on the development of higher mental processes through the mediating effect of the tools, signs and patterns of action' embedded in multiple and diverse social contexts (Hughes, 2004, p.399). Similarly, Jenkins et al., (2006, p.4) suggest that students need opportunities 'to develop the cultural competences and social skills needed' for full participation in the new media landscapes. The new literacies for engagement and participation include

> … social skills developed through collaboration and networking. These skills build on the foundation of traditional literacy, research skills, technical skills, and critical analysis skills taught in the classroom (Jenkins et al., 2006, p.4).

On this point, Goodyear and Zenios (2007) suggest that students need to gain skills in *epistemic fluency*, that is, the ability to recognise and play a number of epistemic games.

According to Goodyear and Zenios (2007) all cultures build and pass on multiple *epistemic forms*. These epistemic forms include models, taxonomies, diagnostic systems, legal precedents and so forth. In the social sciences, epistemic forms may include theoretical frameworks for systematically collecting, analysing and reporting on data. Epistemic forms are comprised of *conceptual artifacts* such as ideas, theories, models, and diagrams which are 'human, immaterial creations having internal logic and serving purposes such as explaining, connecting, predicting or applying' (Goodyear and Zenios, 2007, p.8). Moreover, conceptual artifacts are malleable and therefore capable of morphing into new forms as they are used, worked on, shared and improved.

The knowledge world of epistemic forms is an outer, objective world produced and reproduced by the collective. As information travellers, students need to make personal (subjective) sense or meaning of the objective world of epistemic forms. The subjective world of learning is the inner, personal world of mental states, feelings and beliefs. Goodyear and Zenios (2007) contend that epistemic fluency can be taught by assisting students to move in and out of these two knowledge worlds – the subjective and the objective, and between the different epistemic forms of the objective.

THE STUDY

We report on an Australian Research Council funded project that investigated the ways in which young people construct their own identities and form social relationships in their everyday lives, with and without the use of technology. The overarching aim of the project was to increase fundamental theoretical and professional knowledge about youth identity formation and sociality in online and offline spaces. Specifically, we asked: how do 'tech-savvy' youth engage in, contest and develop a sense of personal and collective identity and membership in the complex new spaces that now constitute their everyday worlds? Data were gathered from two urban and two regional secondary schools in Queensland, Australia. All of the schools actively promoted the use of technology in education; for example, in two schools, students were expected to own and use laptop computers every day. Approximately 170 students aged 12-17 years took part in the study, through online narrative profiles, focus group activities and reflexive interviews.[i]

In the following discussion, we draw on data collected from the focus group interviews. At each of the four schools, the researchers conducted an average of five focus group sessions with approximately ten participants in each focus group. All of the students participating in the focus group discussions had access to computers at school, and reported using computers at home and at school. Indeed, the online narrative profiles reveal that well over half the participant group reported going online at least 5 times a week:

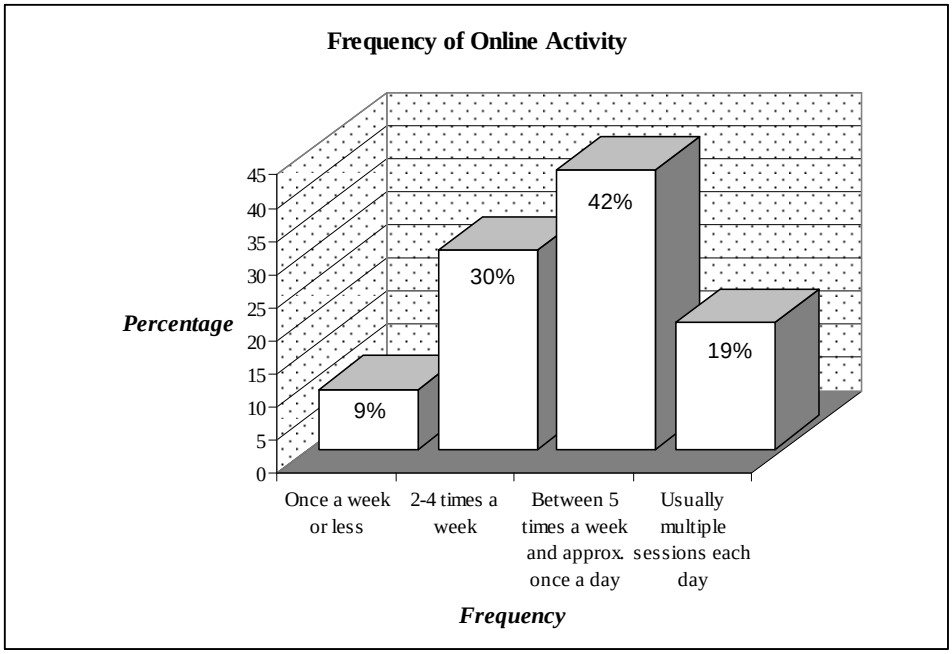

Figure 1: Frequency of Participants' Online Activity

Urban School One is an independent, co-educational day school catering to over 2000 students enrolled in years P-12. All students from Years 4-12 have laptops supplied by the school, both for in-school and at home usage. The school campus is covered by a wireless network. Four focus groups were conducted in this school, including both male and female students. *Urban School Two* is an independent, boys' day and boarding school with over 1000 students enrolled in Years P-12. Five focus groups were conducted at this school, and each focus group included day students and boarders. *Regional School One* is an independent, co-educational day school with over 600 students enrolled in Years 8-12. Four focus groups, including both male and female students were conducted in this school. *Regional School Two* is an independent, co-educational day school catering to over 1000 students enrolled in Years P-12. All students from Years 5-12 have laptops supplied by the school, both for in-school and at home usage. The school campus is covered by a wireless network. Four focus groups, including both male and female students were conducted in this school. Details of participants in focus groups may be found in table 1 (below).

School	Total Participants	Focus group no.	Male	Female	Age Range
Urban School 1	47	FG1	6	6	14-17
		FG2	6	6	15-17
		FG3	5	6	14-17
		FG4	6	6	14-17
Urban School 2	51	FG1	10	0	13-15
		FG2	11	0	13-15
		FG3	9	0	15-17
		FG4	10	0	13-15

		FG5	11	0	14-17
Regional School 1	38	FG1	6	4	12-16
		FG2	6	4	12-16
		FG3	6	3	12-16
		FG4	7	2	12-16
Regional School 2	23	FG1	4	3	12-15
		FG2	2	4	12-15
		FG3	4	1	12-16
		FG4	3	2	12-15
Totals	**159**		**112**	**47**	

Table 1: Details of participants in focus groups

Across all four schools and within each focus group, students were shown a CNN video-clip of American teenagers talking about their experiences of engaging in MySpace and other online worlds. The students were then asked to talk about their own experiences with MySpace and other kinds of new media technologies and applications, including their use of Google and Wikipedia. The audio-taped recordings of the focus group discussions were transcribed and cross referenced with observer field notes compiled during the sessions. These transcripts were then systematically analysed in three phases. In the first phase of data analysis, we focused on the topics and themes that arose within each focus group discussion, within a school context, and across the sample of four schools. The data were coded inductively to firstly identify the major topics and themes, and then to determine the frequency with which these themes occurred across the data set. In the second phase of data analysis, we focussed specifically on the type of language used by youth. In other words, we focussed on the vogue words used, who was talking, and the patterns of agreement and disagreement within each focus group. In the final phase of data analysis we focused on the categories of tech-savvy youth identities constructed in and through the focus group talk.

Students discussed using Wikipedia and/or Google in all but two of the focus groups. Usually, students mentioned these applications in the context of assignment writing and researching, when prompted by the facilitator asking how students began working on assignments or looking for information on assignments. In two groups, students brought up discussion of Google unprompted, but in the context of looking for MySpace backgrounds and tutorials (Urban School Two) and looking for songs online (Regional School 1). Wikipedia was always mentioned in the context of school assignments, although it should be noted that some of the younger students (aged 12-13) from Regional School One had never encountered or used Wikipedia.

Data Analysis

Some of the most significant themes to emerge from the data across all schools locations and student demographics relate to issues of information reliability and validity, and highlight, specifically, the ways in which young people may develop epistemic fluency (as defined by Goodyear and Zenios, 2007) through their interactions with a variety of epistemic forms in multiple online and offline modes. Students' discussions of the ways they researched and

wrote school assignments proved an insightful focaliser for two reasons: (i) because school assignments provide a key motivation for teenagers to seek out and negotiate information in their everyday lives, and (ii) because contemporary school assignments often straddle multiple information sites – offline and online.

The secondary school level research assignment often seeks to teach students skills in evaluating, prioritising and organising information in order to create an authorised and verifiable knowledge document. In engaging with the exercise of assignment writing, contemporary teens are often encouraged to, and are likely to search for, information from online sources, particularly in the technology-rich schools which provided the study's participant pool. These online sources, such as Google and Wikipedia, are often based on epistemologies of convergence, collaboration and co-construction (Whitmire, 2004).

The students' discussions about information and knowledge in relation to assignment research and writing centred on two main themes: (i) the sources from which students gathered their information for school assignments; and (ii) their engagement with the different forms of information they encountered during the search process.

Theme 1: Content – Student Encounters with Epistemic Forms

Critics often describe young people, like the participants in our study, as part of a 'tech-savvy' generation: as digital natives, rather than digital immigrants, as they have grown up in the age of the Internet and spend their time in a complex mix of online and offline spaces (Prensky 2001; Dolezalek, 2003; Lenhart et. al, 2005) Young people's own understandings of themselves may be more complex, and, significantly, they do not necessarily accept or even understand these ways that adults have defined them. For instance, 60% of narrative profile respondents in our study did not agree that the term 'tech-savvy' was an appropriate description of themselves – many did not even understand the term – while participants in focus groups suggested alternative descriptors, such as 'Generation Z' and the 'cyber extreme' generation. Nevertheless, participants often described themselves as technologically-capable compared with their parents and teachers, which suggests an implicit awareness of a generational characteristic, if only within the socio-cultural context of this participant pool.

For these young people, the Internet often represents an information repository of first resort, not only for school applications, but in their out-of-school lives as well:

Data Extract:

Student: *Also I use – we got wireless at my house. […] If I want to know what's on TV, I don't go look at the TV. I look at the internet, see what's on. […] Or if it starts raining, I look at the radar, see if there's going to be rain.*

[Urban School 1: 09/03/07]

It is perhaps then no surprise that most of the students in our focus group sample said that they were more likely to begin searching for information for school assignments online, especially using Google and Wikipedia – the two most favoured sources - rather than starting with offline sources like libraries and library books.

Data Extract:

Facilitator: If you had an assignment or something due or maybe you were interested in something, where do you go to find out about it?
Students: Google.
Facilitator: So would Google be your – where else would you go?
Student 6: No, just Google.
[Regional School 1: 03/05/07]

Data Extract:

Facilitator: […] What's the first thing you do when you get an assignment topic?
Student 1: Go to Wikipedia.
[Regional School 2: 29/03/07]

Although Wikipedia and Google were the favoured starting points for information searching, participants also reported using non-collaborative sources when searching for information for school assignments. These included online sources such as educational and government websites, as well as miscellaneous websites, other electronic sources, such as encyclopedias on CD-ROM, and non-electronic sources such as school library books.

Participants described their preference for online sources in terms of efficiency and yield: researching online *'saves time, 'cause you don't have to go looking for books and stuff, you just type it in, and it's all there*' [Urban School 1: 02/03/07]. Interestingly, online sources were perceived as more *proximal* than library sources: libraries were often described in terms that emphasised their distance from the student, while the Internet was much closer:

Data Extract:

Student: It's easier than going to the library. You have to actually get there [to the library]. *You can just open up your laptop. It's just there.*
[Urban School 1: 02/03/07]

The volume of information available online also strongly influenced participants' preferences:

Data Extract:

Student (A): Yeah. And like if you type in Google, like your source, it comes out like thousands and millions of responses.
Student(B)1:Yeah.
Student (A): Whereas, if you go to the library, they might only have like five.
[Urban School 1: 02/03/07]

Thus, while students draw on both traditional and online sources of information, their preference for Wikipedia and Google as first ports of call suggests that the convenience and efficiency of accessing information 24/7 at the touch of a keyboard is an important consideration. Additionally, the findings seem to indicate that students value having access to high volumes of relevant information even when their actual research needs would be equally

served by fewer sources; in other words, the common perception is that less is not more – more is more.

Theme 2: Process – Student Engagement with Various Epistemic Forms

In their discussions, students not only demonstrated an understanding of the difference between the varying epistemic forms inherent in the informational sources they used for school assignments, they also demonstrated significant agency in their engagement with the implications of those forms. Specifically, participants evaluated the sources they used in terms of quantity and reliability of the information. Non-collaborative sources, especially those published through traditional means or associated with reputable organisations, were perceived to be authoritative and high-quality (very reliable) but low-yielding, whereas convergent and collaborative sources were seen to be of lower quality (less reliable), but higher yield. For example, one student used the *Encyclopedia Britannica* on CD-ROM because '*it has all the answers on it*' [Regional School 1: 03/05/07] (with the emphasis being that the CD-ROM provided authoritative 'answers' not simply information), while students at a different school emphasised the volume of *responses* (not 'answers') to search queries on Google (see data extract above).

Information from collaborative and convergent sources like Wikipedia and Google were widely regarded as being less reliable than, say, school library books, educational websites or recognised institutional sources:

Data Extract:

Facilitator: How do you know it's from a trustworthy site?
Student (A): If you've never heard of the site or never heard of anybody who's writing it or it's just Wikipedia, I wouldn't trust Wikipedia because people can just randomly add stuff to it.
[Regional School 2: 30/03/07]

Data Extract:

Student (A): […] right now, we'd be using internet for most of our assignments anyway.
Student (B): And it saves time, 'cause you don't have to go looking for books and stuff, you just type it in, and it's all there.
Student (C): I still reckon that books, are like more reliable in the information you find.
[Urban School 1: 02/03/07]

Data Extract:

Student (A): University sites and things are always good […] I'm doing an assignment for science at the moment on cancer and I went to the National Australian Cancer Foundation or something like that. You know that that's going to be trustworthy because it's a well-known thing.
[Regional School 2: 30/03/07]

At the same time, participants perceived the quality or reliability of information in relative rather than absolute terms. The purpose or end-use of the information regulated how much time and energy students invested in checking reliability and trustworthiness of various information sites/sources. This recurring issue of reliability, which emerged in discussions with participants from all four schools, reveals the ways that these young people are negotiating a variety of ideas about knowledge and associated value systems in their everyday lives: the concept of reliability in cumulative and collaborative knowledge endeavours such as Wikipedia, for example, rests on the idea that large groups tend to be more knowledgeable than individuals (Sunstein 2006, p.21), but for the purposes of school assignments, participants often perceive reliability in terms similar to that offered by traditional, authoritative knowledge sources like library books.

Participants across all four schools acknowledged that establishing the reliability of collaborative and convergent information sources was a distinct problem. However, they still preferred the convenience, immediacy and high quantity of information available online through Google and Wikipedia to offline sources, like library books, which required more effort to access and use. This did not mean that participants passively accepted the limitations of these epistemic forms. Rather, they actively engaged with the advantages and limitations of these knowledge management systems, and employed a range of strategies to guage the reliability of the information they gathered.

By far, the most common strategy mentioned in all schools and by all student demographics was cross-checking information, for example, cross-checking information between high-ranking Google results, or between a Wikipedia entry and top Google results, or between online and offline sources.

Data Extract:

Student (A): I just type anything in on Google and then it appears.
Facilitator: How do you know it's good information or correct information?
Student (A): I also have a book; I go to the library and pick one up. I use that book and resources from the Internet.
Facilitator: How do you know that the resources from the Internet are accurate information?
Student (A): Well you don't really know; that's why I have the book.
[Regional School 2: 30/03/07]

Data Extract:

Facilitator: So how do you know about that information that you're getting from Wikipedia? How do you know if it is accurate?
Student (A): Compare it with other ones.
Facilitator: Okay, so if you go into Wikipedia and you're looking up something for an assignment, where else would you go then to see if it's accurate?
Student (A): I'd go into Google and then I'd click the first one and if it comes up with that then I'd click another one and see if they're the same.
[Regional School 1: 03/05/07]

Another strategy used by some students was to evaluate the source of the information to work out the legitimacy of the organisation and its website. Participants noted that they looked at the extensions on URLs; for instance, '.edu' extensions were perceived to be the most trustworthy sources, but in one school, where the school search engine only returned .edu extension sites, students believed this gave unsatisfactory and inadequate search returns.

Data Extract:

Student (A): The library homepage gives say year 9 curriculum and then it'll come up with maths, English, all that stuff…
Student(B): It'll give you certain links.
Student(A): …if you need help researching say English something it'll go there and it'll come up with a list of sites that are useful but most of the time I don't find them that useful. I find it better to go Google, type in whatever your subject is and then just go down the list, see which site's the best and then use that.
Student (C): The problem with the [school] website is they only search EDU, like educational sites. The majority of the time the stuff you really want isn't on an educational site.
Facilitator: Why is that?
Student(C): They don't register it as educational.
[Urban School 2: 09/05/07]

Participants using Wikipedia were well aware of the system's tools for establishing the validity and reliability of its information, such as external hyperlinks, discussion pages and editing history functions, and reported making extensive use of these in the context of checking information for use in school assignments:

Data Extract:

Student: Afterward I read the comments that people have written down about it.
Facilitator: Right, so if other people have said this is really useful, this is great or it's a load of rubbish, you then would believe those comments?
Student: Something like that.
Facilitator: And how do you know that they're an authority? Did you ever think about that?
Student: I read the entire section of comments.
Facilitator: Yeah.
Student: I read every single one.
[Regional School 1: 03/05/07]

While cross-checking and site analysis and use of system tools are relatively objective mechanisms for evaluating the reliability of online information, participants also occasionally mentioned that they evaluated information based on their instincts – on what sounded correct, or felt right – or else just 'hoped' it was right, rather than using the procedural logic mentioned above:

Data Extract:

Student (A): Honestly half the time I get Wikipedia and when I do I have a look, if it sounds okay and it is not for a assignment that it worth 50 per cent of my mark for a whole year or something I usually just stick to it and trust it, because it is not that important. But, if it really important or if I am doubting it I go on another page to verify what Wikipedia has said.

Facilitator: How do you know that it is sounds okay? How do you know that it feels okay?

Student (A): Because most things you don't actually…

Student (B): Use big words.

…

Student (A): If the person sounds like they know what they are talking about, they're usually all right.
[Overspeaking]

[Urban School 2: 09/05/07]

While this type of response would seem to indicate purely affective evaluation strategies, we would suggest that, to some degree, it reflects the normalisation or naturalisation of practical student work. Specifically, the notion of information 'sounding okay' may actually indicate that the students have internalised the complex signifiers of authenticity or reliability which may be evident in online documents; similarly, the response of 'guesswork' also suggests some kind of internalised criteria for reliability, even if the participants are not able to articulate this overtly. In other words, students acquire tacit forms of knowledge by the epistemic activities of online searches. This inference is supported by the context of these comments: in both the urban and regional focus group data extracts, participants explicitly or implicitly referred to the probability of information being reliable as opposed to being incorrect or fake. The students who stated that they 'just hoped' the information on Wikipedia was accurate demonstrated less evidence of implicit evaluation. However, it does indicate that these young people have learned to trust the site, possibly based on its reputation or their own experiences with it; this may in turn indicate that their judgement was at least partially informed by rational, objective evaluation.

DISCUSSION

The focus group data reported in this paper clearly indicate active engagement in different epistemic forms. Students talked about using online search engines to collate information. Often these search engines were the first or initial strategy in mapping the information terrain or information-scape (Appadurai, 1996). Students then moved onto more sophisticated search engines, websites and reference books. Internet search engines were popular because they provided quick access to volumes of information from the comfort of a home computer and the touch of a keyboard. Moreover, this information could be readily shared, checked, and incorporated into word documents. Our finding here is consistent with that reported in other research studies. For example, Livingstone and Bober (cited in Cranmer, 2006: 301) report that '60% of 9-19-year-olds in full-time education view the Internet as the most helpful tool in getting information for homework.'

Students were cautious about the information available on the Internet, and talked about strategies used to check knowledge authenticity. These strategies were often tacitly acquired from the practical work of online knowledge activity. Students also talked about how collaborative knowledge was produced in online sites such as Wikipedia. At the same time, they discussed their own collaborative strategies of content sharing in terms of assignment writing and what this meant in terms of intellectual property and school assessment of individualised work.

We suggest that the young people participating in this study from independent regional and urban secondary schools in Queensland, Australia moved easily in and out of online and offline environments. Much of the epistemic activity associated within online environments was acquired in 'out-of-school' spaces through peer-to-peer exchanges (see also Burnett & Wilkinson, 2005; Cranmer, 2006). While some of the schools participating in this study expected students to purchase laptop computers, students claimed that these were often not used during school activities. In addition, the schools web-server blocked access to many internet sites. Students thus reported that much of their internet activity happened at home, or in the homes of friends. Knowledge acquired through this practical work was often 'tacit', 'personalised' and 'embodied'. Students shared this knowledge with others by 'doing' and 'showing' (see also Hughes, 2004; Jenkins et al., 2006).

The focus group activities of the research project provided a forum for young people to 'voice' or 'verbalise' the tacit knowledge gained through practical knowledge work. Such verbalisation moved knowledge from the individualised and personalised context to a group context. The group was then in a position to question and learn from all participants about the epistemic activity of information searches, verification and collation. Thus, the focus group work served two purposes. It became a means for collecting/producing knowledge about young people's engagement with online worlds. It also became a vehicle or device for moving information from the personalised/subjective domain to the objective domain. This also made visible the 'choices' available to students in terms of 'shopping' for information, producing and submitting school assignments (see also Cranmer, 2006).

At this stage of the research project we are not in a position to suggest that the knowledge shared during the focus group activities was re-embedded into the practical work of online and offline epistemic activity. We do, however, propose that students' engagement in peer-to-peer online epistemic forms needs to be actively scaffolded through explicit pedagogic strategies. On this point Achterman (2006, p. 20) suggests that 'explicit instruction in the inquiry process' is needed to assist students engage in 'meaningful interactions with each other and the data they are uncovering'. It is through such pedagogic strategies that students are likely to acquire epistemic fluency, that is, the resources to navigate and negotiate the boundaries of multiple and diverse epistemic forms.

Recent articles in the popular press suggest that students are uncritical of the limitations of Wikipedia and Google as information sites (see Frean, 2008). They suggest banning Wikipedia and Google from schooling and teaching students interpretative reading skills from 'peer-reviewed printed texts' (Brabazon cited in Frean, 2008). By contrast, we argue that students draw on tacit knowledge to navigate and negotiate the multiple information scapes of the digital age. This tacit knowledge is often acquired in informal, out-of-school

contexts as students collaboratively experiment with new information communication technologies. Rather than being uncritical consumers of information, our study indicated that students are aware of the limitations of online sites such as Google and Wikipedia. In addition, students regularly calculated time/energy investments required to access and acquire information from multiple sources. Wikipedia and Google were used where there was a low return value from time/energy investments in negotiating information scapes. In those situations which required high investments of time/energy to gain high return value, students accordingly made such investments. In other words, Wikipedia and Google were used as first rather than necessarily final destination sites when students traversed information scapes. This was particularly the case when high investments of time/energy are required in traversing information scapes to access, acquire and report on complex knowledge forms.

This paper raises several pedagogical considerations. In particular, our research has highlighted: (i) the significance for teachers and students to understand the different forms of information sources/tools that are increasingly available through web 2.0 platform, and the varying potential or value of these tools for information access and knowledge co-construction; (ii) the ways in which students traverse information scapes across both online and offline networks to access, acquire and share new knowledge; and (iii) the investments (personal, social, technological) required to access the vast knowledge networks available to students.

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[i] **Focus group protocol:**

Allocated time: 40 mins approx.

1. Welcome, introduce research team, thank students
2. Short context for video (in this video you will see a group of American teenagers talking about their use of MySpace)
3. Show video clip (2 mins approx)
4. We are interested in hearing about your interactions with MySpace or other online spaces such as Hi5 or Bebo or any other. Do you have a MySpace page? What do you like about MySpace? Any problems? Issues that you are aware of eg privacy; unwanted contacts etc.
5. Invite pairs to talk freely and jot down points which can be discussed with the group (1-2 mins)
6. Open up to group talk (probably need lots of prompts and probing questions: eg. Is there any advice you would offer a younger person who has not used online spaces such as this before?)
7. We are also interested in other ways you interact with technology in your everyday lives (eg online gaming and role playing; blogs; developing music plays; producing flyers, newsletters etc; Youtube; ebay; SMS texting; digital photos….) Students tend to offer lists so there is the need to probe further into choices, kinds of pleasures derived, problems encountered, restrictions that are placed on them, parents' attitudes to the time spent with tech, etc.
8. Adults and the media often have particular concerns about young people and their involvement with technology. I have some quotes that we have collected from newspapers, current affairs shows and other media outlets and we would like to hear your views about them. (Read a selection of quotes from list we have prepared.)